

Clinician Guide to Shiga-Toxin Producing or Enterohemorrhagic *Escherichia coli* (STEC/EHEC)

Background:

E. coli is a part of the normal flora of the bowels. Some *E. coli* contain genes that produce Shiga toxins (cytotoxins similar to those carried by *Shigella*) and give the bacteria the ability to attach to epithelial cells. These strains are usually referred to as Enterohemorrhagic or Shiga-toxin producing *E. coli* STEC or EHEC.

Clinical Picture:

STEC can cause a range of clinical disease from relatively mild diarrhea up through hemorrhagic colitis and hemolytic uremic syndrome (HUS). Typically, patients present with cramping and severe bloody diarrhea; however, STEC can cause sub-clinical disease and you cannot rule out STEC when frank blood is not present.

The hallmark of HUS, usually seen in children under the age of 5 and the elderly, is a microangiopathic hemolytic anemia combined with thrombocytopenia. More than 10% of patients die and an additional 25% may have significant long-term sequelae.

Diagnosis:

There are a variety of laboratory tests and algorithms for the diagnosis of STEC. Some laboratories will perform a screen for STEC as part of their routine enteric pathogen cultures, but in other laboratories a separate test must be ordered.

E. coli O157 is a common strain of STEC, but other strains, such as O121 and O26 can cause significant disease or HUS as well. Many labs only screen for O157 and will not be able to identify O121 or other strains. Check with your laboratory to determine if they routinely test for STEC and which strains are identified.

Some common laboratory tests for this organism include:

- Testing for the presence of Shiga toxin. This is an EIA test that identifies the presence of Shiga toxin in the stool. This test will identify most STEC cases and is the most sensitive test available to diagnose STEC. Laboratories employing this method typically send positive stool to the Utah Public Health Laboratory to see if the specific causative agent can be identified.
- Culture for *E. coli* O157. Some laboratories culture for O157, but not for other strains of STEC. Studies in Utah show that roughly 50% of the STEC isolates are strains other than O157. Therefore, a negative test for O157 does not rule out the possibility of STEC infection.

It is important to test for this organism so that outbreaks can be identified and controlled. Public health can fingerprint the isolates to determine outbreak linkages.

Therapy:

Some studies have shown a weak association between antibiotic therapy for STEC and the subsequent development of HUS. A meta-analysis of studies was inconclusive. Until further studies are completed, antibiotic therapy for STEC is not recommended.

Transmission:

STEC transmission can be foodborne (through contamination during growth or processing or through cross-contamination during preparation), waterborne, or person-to-person through fecal-oral transmission. Transmission requires a low infectious dose and large outbreaks can occur. Secondary transmission can occur. Patients and caregivers should practice good hand hygiene to reduce the likelihood of transmission to others.

Reporting:

All cases of STEC (including O157:H7 and other strains) are reportable to public health. Due to the risk on large outbreaks, public health has an important role in identifying and mitigating possible transmission sources.

References:

1. Mandell, G.L., et.al., Principles and Practice of Infectious Diseases, 6th Edition, 2005
2. Safdar, N., et.al., Risk of Hemolytic Uremic Syndrome after Antibiotic Treatment of *E. coli* O157:H7 Enteritis: A Meta Analysis. JAMA 288 (8), 996-1001, 2002.
3. Nataro, J.P. and Kaper, J.B., Diarrheagenic *Escherichia coli*. Clin. Micro. Revs 11(1), 142-201, 1998.
4. Thorpe, C.M., Shiga Toxin-Producing *Escherichia coli* Infection. Clin. Infect. Dis 38, 1298-1303, 2004.